on p. 66. The superficial deposits of the dry region include much calcareous tufa, and recent quartzites appear as we go westward into the genuine desert.

Prof. T. W. Edgeworth David has issued the first part of his description of "The Hunter River Coal Measures, New South Wales" (Mem. Geol. Survey, N.S.W., 1907, price 12*s.* 6*d.*). This memoir, forming a handsome quarto volume, explains the numerous coloured maps and sections that have been published under a separate cover. The plates will interest the practical miner as well as the geologist. The sedimentary rocks and typical fossils are here excellently illustrated. The limits of the Australian Permo-Carboniferous system are discussed (p. 311); glacial beds, 200 feet thick (p. 321), occur in the Lower Marine series, and ice-borne erratics have been dropped into the Upper Marine muds, which are indented by them (p. 197 and Plate xxiv.).

The New Zealand Geological Survey, in Bulletin No. 4 (1907), by Messrs. C. Fraser and J. H. Adams, describes the geology of the Coromandel subdivision, Auckland. This area includes the oldest goldfield in New Zealand, which is at present not particularly flourishing. The Hauraki mine, however, must have amply rewarded its original shareholders. The veins containing gold and silver, whether in the Jurassic and older sediments or in the Cainozoic andesites, are connected with the extrusion of the latter (p. 98). The bulletin is as finely illustrated as its predecessors, and many of the plates are of interest to petrographers, full attention being given to sedimentary as well as igneous rocks. The price of the volume, including four coloured maps in a pocket at the end, is 2*s.* 6*d.*, a sum that is in keeping with the liberality of colonial Governments in these matters.

Bulletin No. 5 (1908), by Mr. James Park, on the geology of the Cromwell subdivision, forms an equally handsome volume, and contains some interesting details as to the distribution of gold-bearing material by glacial action. No natural sorting out of the gold occurs in moraines, which thus are less satisfactory than ordinary pockets in alluvium.

The Annual Report of the Geological Survey of Canada for 1904 was issued in 1906, but did not reach us until the present year. Bound up with it are several separately paged papers, including reports by Mr. Keele and Mr. Camsell on rivers in Yukon, and by Dr. G. A. Young on Mount Yamaska, in Quebec. The Yamaska mass affords a study in igneous differentiation, with basic "yamaskite" in the centre, graduating outwards into "essexite," and then into "akerite," with nearly 60 per cent. of silica. The Summary Report of the same survey for 1906 appeared in 1907, and shows the wide range of the work, attention being especially directed to mineral resources and to the economic possibilities of new routes opened across the country. Mr. W. W. Leach's separately printed paper on the Telkwa River and vicinity, British Columbia (Geol. Surv. Canada, Ottawa, 1907), shows the pioneer work that falls to the geologist, side by side with the miner, in this great Dominion.

Since our last article on "Geological Work in the United States" (NATURE, vol. lxxviii., p. 282), we have received the annual report of the Geological Survey of New Jersey for 1907 (Trenton, 1908), and vol. vi. of the Maryland Geological Survey, dated 1906. The former is distributed for the cost of postage, and includes an interesting and surprisingly direct warning to would-be investors (p. 15) against speculators in the Portland cement industry. Mr. J. V. Lewis has written on the petrography of the Newark igneous rocks. His memoir (pp. 96–168 of the report), which is very fully illustrated, contains a description of certain inclusions of arkose in diabase (p. 134), which have assumed the composition and partly the structure of augite-granite. The green augite present has been probably derived from the igneous invader, but the defects of any chemical classification of rocks are emphasised more than ever when we learn that one of these altered masses should fall into the "dosodic subrang of the rang *alaskase*," and another into the "presodic subrang of the rang *dacase*." When Mr. Lewis shows us the origin of these rocks in the field, such nomenclature appears as a mere learned trifling. The basaltic lavas of the Watchung area are admirably described, and their zeolites are attributed to the action of "juvenile" waters during the cooling of the flows. The Maryland volume is, as usual, very handsome, but far too heavy for the hand. The whole physiography of the State is dealt with, and a general account of its geological structure follows. The first 251 pages, covering also the soils and meteorology, form, indeed, a popular and exact guide for any educated citizen. Mr. E. B. Mathews contributes a history of the origin of the counties of Maryland, occupying more than 150 of these weighty pages; we must presume that this, like the reports of the highway surveyors, finds its most fitting place within the green covers of this well-known geological series.

The Annual Report of the Iowa Geological Survey for 1906 (1907) deals extensively with Portland cement and with the rocks quarried for economic purposes in the State. The analyses and tests of sedimentary building-stones have a petrographic as well as an engineering value, since these types of rock are apt to be neglected.

G. A. J. C.

THREE VOLUMES ON NORTH SEA FISHERY INVESTIGATION.[1]

THE first of the volumes referred to below reports a meeting of the International Council named, held in London last year, and also contains accounts of numerous researches. Both parts possess features of, in some respects, unusual interest, to only a few of which reference can be made in the present brief notice. The meeting was memorable as the occasion of some remarks made by Earl Grey in the course of an address of welcome, which made it clear that the British Government intended to continue to support marine research in the interest of the fisheries, and looked favourably on international co-operation in the matter. Since the conference a committee has been appointed by the Treasury to inquire into the prosecution of such researches, has heard evidence, deliberated, and lately has made its recommendations, which include plans for the organisation of the work. There seems, therefore, every probability of British fishery research being placed on a permanent basis, and an opportunity has obviously occurred which, if wisely dealt with, may result in an important step in the application of biology to industry.

Another interesting announcement was that of Commander Drechsel, who stated that a convention had been arranged between Sweden and Denmark which would prevent the landing in these countries of undersized fish from the Kattegat, including its extra-territorial waters. This convention is said to be due to the results of research. The results in question appear to be embodied in the "Summary Report on the State of our Knowledge with Regard to Plaice and Plaice Fisheries," by Petersen, Garstang, and Kyle.

This summary, which is as able as it is concise, was prepared in response to a request of the Dutch and Danish Governments. It deals with very varied studies, and is backed by a formidable array of seventy-four tables. It recommends legislation against the landing of small plaice from the Kattegat, because these small fish are not fatally injured by the methods of fishing there employed, rarely leave the district, and increase in value with growth to an extent which amply compensates the fishery for their loss as small fish. The conditions in the North Sea are felt to be more complex, and for this area no legislation is recommended, though the report favours the transplantation of plaice to good feeding-grounds. An apparent discrepancy between the estimates of intensity of fishing and of its effects calls for mention. The intensity of fishing in the Kattegat is held to be greater than in the North Sea; yet while the evidence (described as "not large") points to a lowering of the average length of North Sea plaice, the weight per score of Kattegat plaice of above 25·6 cm. length is not declining (Table III.). If North Sea fishing kills off the large plaice more quickly than nature replaces them, *a fortiori* the largest Kattegat

[1] (1) "Rapports et Procès verbaux des Reunions. Conseil permanent international pour l'Exploration de la Mer." Vol. vii. Pp. xxxviii+314.
(2) *Ibid.*, vol. viii. Pp. 125; plates 12.
(3) "Bulletins trimestriel des Résultats acquis pendant les Croisières périodiques." Année 1906-7. No. 3. Pp. 33–95; plates 9.

plaice should disappear. Of course it is theoretically possible that average length should decline without average weight, owing to the reduced competition for food attending a thinning of the population—though in that case the utility of a size-limit is not obvious—but in all probability the discrepancy is due to paucity of data in one or the other of the areas, and will disappear with the collection of more information. The point does, however, emphasise the importance of testing the adequacy of samples of fish used for statistical purposes, a matter which is dealt with in another paper of the volume on the Ymuiden plaice measurements.

The secretary concludes his official record of the conference with a reference to the reception of the council by the King, and with pleasant, if a little quaint, expressions of thanks to the institutions and gentlemen who constituted themselves hosts, and to the clubs which "opened their hospitable localities" to the members.

The second volume before us is devoted to the seals of northern Europe. The material used was collected by Hjort and Knipowitsch, and is of the most diverse character, ranging from zoological literature to the journals of sealing vessels. The intention in dealing with this data was to give accounts of the biology, economic value, and influence on fisheries of seals, and to arrive at conclusions on the question of their extermination. The first of these purposes is admirably carried out by Dr. Wollebæk in a paper well illustrated by charts and plates, the account of the distribution and migrations of the seals being especially interesting. The report is in two parts, a Norwegian and a Russian, and it is evident that the value attached to sealing by the Russians prevents their sympathising greatly with Norwegian projects for the extermination of these animals. The charges against the seals are that *Phoca vitulina* damages the salmon fisheries, which is generally admitted, and that *P. groenlandica*, *P. foetida*, and *P. vitulina* also damage the fishery for the cod which follow the "Lodde" (*Mallotus villosus*) to the coast of Finmark, in exceptional years causing its complete failure. The damage done by hordes of fish-eating seals in the exceptional "seal" years, such as 1902–3, must be very great; yet the report would undoubtedly have gained in value had more attention been paid to the admitted possibility that the exceptional conditions which brought the seals also drove off the fish. The hydrographic conditions of the years in question were so exceptional that they may well have determined the failure of the fisheries; yet they receive but brief recognition, and the resulting impression is somewhat that of a trial confined to speeches for the prosecution. One feels that, were the seals eliminated, the Lodde fishery would possibly still be liable to sudden failure.

The third publication under notice is one of a series issued at fairly regular intervals, and contains the detailed hydrographic and plankton observations made by the vessels employed in the international researches during the first quarter of 1907, together with illustrative charts and sections. The periodic preparation of these bulletins must be a severe tax on the time and energies of the workers, but the resulting records should be of great utility to those studying the North Sea and English Channel.

THE DAWN OF METEOROLOGY.[1]

METEOROLOGY as a science is young, but as a branch of knowledge very old, perhaps as old as mankind. Indeed, the beginnings of meteorology are to be found with the origin of human civilisation. In those remote times, man living as hunter or agriculturist mostly in the open air was more influenced by, and more depending on, the weather than we are ourselves at present, and he was therefore forced to watch atmospheric phenomena. He did so, of course, not in order to study the atmosphere and to discover its laws, but to derive immediate advantages for himself. He was anxious to learn how to protect his house against the inclemency of the weather, how to foresee the best atmospheric conditions for his undertakings, or how to find out the most favourable climatic situations for his fields.

The experience of the more intelligent men in this respect was handed down, and at the same time augmented, from generation to generation, and formed very early an essential element in the knowledge of the people.

It was the popular weather-wisdom which is still living nowadays, and will never die. This weather knowledge soon assumed the form of short proverbs, or rather absolute rules, because thus they were easily committed to memory.

It would, therefore, be wrong to imagine that the rich store of weather-lore found in the Bible, especially in the Book of Job, in the poems of Homer and Hesiod, that is, in writings of the eighth century B.C., originated then in Palestine or Greece. On the contrary, the familiarity of the people with the sayings and rules concerning the weather, revealed to us by these writings, shows clearly that they must be considered even then as a primeval stock of culture. Indeed, there is every reason to believe that the origin of a great deal even of the modern weather-lore can be traced to its Indo-Germanic source.

People attribute a good deal of prognostic signification to the so-called "twelve nights" (or "twelve days"), which formerly were counted from the beginning of the year, but later, under the influence of the Christian Church, from Christmas. People believe that the weather of these twelve nights (or days) corresponds with that of the twelve months of the following year—indeed, a rather simple forecast of long range if it were true! This superstition is met in the whole of European literature back to the fifteenth century, and still earlier in many MSS. Also the Venerable Bede mentions it; and the Byzantine-Greek work on agriculture, called "Geoponica," which was collected in the sixth century A.D., tells us that even Democritus, in the fifth century B.C., was familiar with it in pretty much the same form. On the other hand, we learn from the Sanskritists that the old Indian or Vedic texts reveal the same belief in the twelve nights as a symbol of the following twelve months. But this superstition not only spread westwards with the Indo-Germanic race, it migrated also eastwards to China, where on New Year's Day a custom is still in use which is based on the same Indo-Germanic conception.

Another superstition concerning the weather leads us to old Babylonia. Many European chapbooks of past centuries, and a little Swedish book, "Sibyllæ Prophetia," which is sold to-day at fairs, contain forecasts of the weather and fertility of the whole year deduced from the thunder heard in each of the twelve months. These *signa tonitrui* can be followed up in MSS. until the Middle Ages, and go back apparently to the rich literature of thunder-almanacs or brontologies, in the composition of which in the fourth and fifth centuries even Byzantine emperors have taken part. In a similar chapter of the already cited Greek book "Geoponica" this doctrine is attributed to Zoroaster. Though this may not be the real author, yet his name indicates its Oriental origin; and, indeed, I found in the works of the Assyriologists—Sayce at Oxford and Lénormant in Paris—some translations of cuneiform tablets proving the Chaldaic origin of this superstition concerning thunder.

The state of meteorology in the old Babylonian culture, namely, three to one thousand years B.C., shows quite another character than it did in those primeval times in which the weather proverbs originated.

After having been formed into the beginnings of a learned profession by the priests, the atmospheric phenomena were brought by them into connection with the constellations of the heavenly bodies, and a complete system of consequences and combinations was established which gave rise to the astro-meteorology. It even formed an integral part of the Assyric-Babylonian religion.

The meteorological observations of the Chaldeans were apparently of a quite selective nature, referring above all to optical phenomena, especially to the halos. They distinguished clearly the small halo of 22° diameter, called "tarbasu," from the greater one of 45°, called "supuru." Besides, they paid much attention to clouds, winds, storms, and thunder; but a good many of these observations served more for a general prophecy of good and bad things, or omens, than for the forecast of the weather.

[1] Abridged from a lecture delivered before the Royal Meteorological Society by Prof. G. Hellmann, and printed in the Quarterly Journal of the Society, October, 1908.